STANDARD OPERATING PROCEDURE

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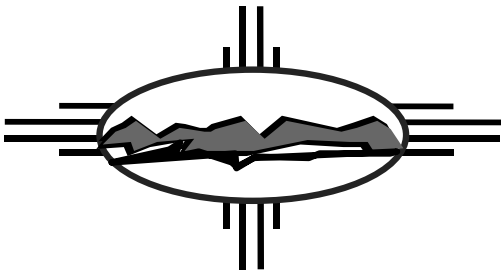

ER PROJECT

APPROVALS FOR USE

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LOS ALAMOS NATIONAL LABORATORY

FIELD LOGGING, HANDLING, AND DOCUMENTATION OF BOREHOLE MATERIALS

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FIELD LOGGING, HANDLING, AND DOCUMENTATION OF BOREHOLE MATERIALS

NOTE: ER Project personnel may produce copies of this procedure from the controlled document electronic file. However, it is the user's responsibility to assure that they are trained to and utilizing the current version of this procedure. The procedure author may be contacted if changes are unclear.

1.0 PURPOSE

This procedure states the responsibilities and provides instructions for field logging, documentation and, handling of borehole materials at the Los Alamos National Laboratory Environmental Restoration (ER) Project.

2.0 TRAINING

2.1 All users of this SOP are trained by self-study, and the training is documented in accordance with QP-2.2, Personnel Orientation and Training.

2.2 The **Field Team Leader** (FTL) will monitor the proper implementation of this procedure and ensure that relevant team members have completed all training assignments (see Section 7.0) in accordance with QP-2.2, Personnel Orientation and Training.

3.0 DEFINITIONS

3.1 ***Core*** - A core is a cylindrical section of rock, or fragment thereof, that is taken as a sample of the interval penetrated by a core bit and that is brought to the surface for examination and/or analysis.

3.2 ***Core Run*** - A core run is an attempt to drill and recover a length of core; also the piece of core recovered from a core barrel during the core run.

3.3 ***Curation Plan*** - A document summarizing a specific Field Unit's plans for sample handling, specimen collection, and core curation. Included planned depth of boreholes, number of specimens to be removed, and a schedule for these activities. The Curation Plan also allow the Field Team a place to document options in sample curation available in this SOP.

3.4 ***Cuttings*** - Cuttings are chips of rock produced during drilling that are removed from the borehole by circulation of drilling fluids (gas, foam, or liquid).

3.5 ***Daily Drilling Summary*** - The Daily Drilling Summary is a primary record of daily drill-site activity. The Field Team Leader (FTL) is responsible for keeping a chronological record of activities (using a 24-hour time clock) that

occur during drill-site operations. An example can be found in LANL-ER-SOP-4.01, Drilling Methods and Drill-Site Management.

3.6 ***Drilling Package*** - A Drilling Package is prepared for each field unit (FU) and includes the general and detailed requirements for performing drilling and associated activities. The Drilling Package consists of a detailed Drilling Plan, drilling specifications, Curation Plan, and Geophysical Logging Plan and specifications to meet the sampling requirements defined in individual RFI work plans.

3.7 ***Field Support Facility*** - The Field Support Facility (FSF) is Building TA-3-271 and houses both the Sample Management Facility (SMF) and the Sample Management Organization (SMO). The SMF manages borehole samples and the SMO manages analytical samples.

3.8 ***Fluids*** - Fluids collected as samples include gases and liquids.

3.9 ***Rubble*** - Rubble is defined as pieces of core with diameters smaller than half the diameter of whole core, such that reconstruction between individual pieces is not possible.

3.10 ***Sample*** - A sample is a physical entity, collected in the field, representative of the whole, that is the original source material for all subsequent analyses and testing activities.

3.11 ***Sample Management Facility*** - The SMF is one of the organizations housed in the FSF and is used for the documentation, examination, physical processing, storage, and control of selected samples, remnants, and records collected and distributed for the ER Project. The SMF consists of a physical facility and equipment designed to effectively process and preserve these samples, remnants, and records.

3.12 ***Sample Management*** - The collection, documentation, storage and control of selected borehole materials and records. The Subsurface Technologies Team is responsible for guiding sample management activities at the drill site.

3.13 ***Specimen*** - A specimen is a subsection or portion which has been removed from a sample that undergoes testing, analysis, or other technical or scientific evaluation. It is also referred to as an analytical sample.

4.0 BACKGROUND AND PRECAUTIONS

4.1 This procedure is limited to the activities necessary to take custody of core and cuttings from drill rig personnel, conduct field screening, remove time sensitive analytical samples, complete photo documentation, perform field

structural and lithologic description, and mark, package, and temporarily store the borehole materials at a drill site Sample Storage Trailer. This procedure does not address the collection of soil, rock, or fluid samples exclusively for field screening or laboratory analysis for hazardous or radiological waste. The collection of borehole fluids will be controlled by LANL-ER-SOP-1.02. Analytical sample containers and preservation will be provided by SMO.

4.2 This procedure prescribes the specific sample management methods to be followed and documentation to be prepared during handling and field logging of borehole materials identified in the site Curation Plan. A copy of this procedure, with supporting references and forms, will be available at the drill site at all times. The FU-specific Drilling Package and Sampling and Analysis Plan (SAP) will also be available at the drill-site.

4.3 The requirements of this procedure are subject to modification depending on the exact nature of the borehole being drilled, as delineated in a Drilling Package. Borehole materials temporarily stored at the Sample Storage Trailer will be maintained in environmental conditions as defined in the relevant Curation Plan for each FU. Site workers will be familiar with the site-specific Health and Safety Plan and will participate in all site pre-entry and safety meetings.

4.4 The site specific Health and Safety Plan will function as the document defining the types and extent of monitoring activities to be performed before, during, and after borehole material collection and processing activities.

4.5 Before drilling operations, a Sample Management Core Logging Trailer and a Sample Storage Trailer will be set up at the drill site (see LANL-ER-SOP 1.01, General Instructions for Field Investigations). Copies of the Drilling Package, reference materials, applicable procedures, and an adequate quantity of documentation forms will be available in the Core Logging Trailer.

5.0 EQUIPMENT

5.1 Sample management field equipment will be assembled before initiation of field activities. The Sample Management Core Logging Trailer will contain the following equipment: core racks, core transport trays, work table, photography apparatus, and container labeling and packaging equipment. The unit will be well-lighted and will be heated and ventilated. The unit will be secure, and operated as a limited access facility.

5.2 The suggested equipment and supplies to be used are listed in Attachment A.

6.0 PROCEDURE

Note: Deviations to SOPs are made in accordance with section 4.9 of ER-QP-4.2, Standard Operating Procedures Development.

This procedure controls the site worker's handling of the core from the time the core is withdrawn from the outer drill tube until the core is ready to be transported to the ER Project's SMF. For the purposes of this SOP, core may also refer to other solid samples, such as drive samples, or augured samples. These activities will be performed under the direction of the Field Team Leader (FTL). The number of site workers involved in handling the core inner tubes will be kept to a minimum to simplify chain-of-custody interactions and to reduce total number of personnel that are necessary in exclusion zones.

Core handling procedures will be performed in sequential order. Any deviation from this procedure or from the Curation Plan requires prior consultation and agreement with the Field Project Leader (FPL) and the FTL. Deviations and the rationale for changes in methods will be recorded on the Daily Drilling Summary.

Personal protective gear will be worn at specified levels outlined in the site specific Health and Safety Plan. All personnel handling the cores and other samples shall wear the required protection. Personnel handling the samples will use new clean gloves each time a new core tube is handled.

6.1 Sample Staging

The driller or helper will collect the core (or other sample form) according to drilling methods outlined in the Drilling Package, withdraw the sample from the borehole, and place the inner tube or sampler on new plastic sheeting, located on a work bench in the Exclusion Zone.

6.1.1 Field Screening

6.1.1.1 Once the sample has been placed on the work bench, technicians from the Health Physics Group (ESH-1) and the Industrial Hygiene and Safety Group (ESH-5) will screen the samples for radioactive/hazardous constituents. This screening will be performed for two purposes: 1) to collect field screening data that will determine the immediate hazards due to handling of the samples at the site, and 2) to determine the levels of certain radiological and non-radiological characteristics for comparison with SMF health and safety based acceptance criteria for samples.

6.1.1.2 A comparison will be made with the action levels for radiation and organic vapors established in the site Health

and Safety Plan. If readings indicate activity or concentrations above action levels, then sample handling activities will temporarily be suspended. A decision will be made by the Site Safety Officer (SSO) and FTL as to restarting work with upgraded personal protective equipment, modification of the level of logging required in this procedure, or other means to ensure the health and safety of workers.

6.1.1.3 Field screening values for penetrating radiation, radiologically contaminated particles, and volatile organic compound contamination will be recorded on the SMF Field Screening Log (Attachment J) or equivalent. The prescribed field screening techniques and levels are shown in Table 1.

6.1.1.4 Samples will be field screened on a run by run basis, the data recorded and certified by the ESH-1 and ESH-5 technician(s) on the SMF Field Screening Log (Attachment J) or equivalent. Additionally, the technicians will record the screening data on an index card that will correspond to the core run. This card will stay with the core run as it is moved to the Core Logging Trailer or the Sample Storage Trailer. The Log (and index card)

TABLE 1

Health and Safety Based Acceptance Criteria For Samples Submitted To The Sample Management Facility

HAZARD	SCREENING METHOD	ACCEPTANCE CRITERIA
Penetrating Radiation	Gross Beta/Gamma Detector	<100,000 dpm/100 cm^2 @ 1 in from sample
Beta/Gamma Contaminated Particulates	Beta/Gamma Detector	<100,000 dpm/100 cm^2
Alpha Contaminated Particulates	Gross Alpha Detector	<1,000 dpm/100 cm^2
Volatile Organic Compounds	PID, FID	<5.9 ppm total VOC

will indicate whether the samples are above or below the acceptance criteria. If above, the samples will be held at the Sample Storage Trailer on-site until a determination is

made as to their disposition. If below, the samples are now available for movement to the Core Logging Trailer and subsequent transport and acceptance at the SMF (SM-271). There may be additional screening required prior to unconditional release to the SMF. For example, additional screening could consist of liquid scintillation counting for sites suspected of being contaminated with tritium or alpha/gamma spectroscopy for unidentified radionuclides.

6.1.2 Samples to Core Logging Trailer

Upon the determination that samples are safe to handle in the Core Logging Trailer:

6.1.2.1 Site workers will obtain run information (Run Number, Depth Interval) from the driller or a helper. The driller will provide the information on a run card (4" X 6" index card or equivalent). The site workers will also gather the field screening data index card from the ESH-1 and ESH-5 technician(s). Site workers will place the run card at the top end of the core in the inner liner or core transport tray. Site workers will ensure that the core is not switched end-for-end during transport to the Sample Management Core Logging Trailer.

6.1.2.2 The core will then be transferred to the Sample Management Core Logging Trailer. Site workers, or alternatively, drill rig personnel will carry the core transport tray to the Core Logging Trailer and place in a core rack lined with clean polyethylene sheeting.

6.1.2.3 A polystyrene foam run marker (Attachment C) replaces the driller's run card at the top of the run.

6.2 Core Measurement and Determination of Core Loss

6.2.1 Temporary Packaging of Time Sensitive Analytical Samples

6.2.1.1 Many time-sensitive analyses require that analytical samples be collected, containerized, and preserved soon after the borehole materials are brought to the surface. The requirement for the removal of analytical samples directly from the drill site will be delineated in the site specific Curation Plan.

6.2.1.2 Individual sections of core containing analytical samples that would suffer damage if left exposed while awaiting measuring, marking, photography, and logging will be temporarily packaged.

6.2.2 Measurement of Run Interval

6.2.2.1 Starting at the top of the core run, pieces of core will be fitted together to reconstruct larger sections of core. Rubble zones will be reconstructed to accurately represent the interval from which they were recovered.

6.2.2.2 The core will be measured with a steel engineering tape to the nearest 0.1 ft. Enter the amount of core drilled and recovered on the Run Marker, the Core Sample Log, and on the Daily Drilling Summary. True core loss will be determined as described in the following section and do not document core loss until the next run is recovered.

6.2.3 Determination of Core Loss

6.2.3.1 If a core loss is indicated after measuring the core, the site workers and the driller will attempt to determine the interval(s) at which the loss(es) occurred.

6.2.3.2 If the bottom portion of a run is not recovered until the following run is cut, this apparent core loss may result in inaccurate core measurement. The core may be recovered in the following run and may be identified by bit marks, core match, or other clues. The core stub may also be ground up and subsequently recovered as rubble in the next run.

6.2.3.3 If more core is recovered from the barrel than was cut by that run, reconcile the extra core with the last (up hole) core loss or with the next down hole run. Sometimes more core will be recovered from a run than was cut because of the way the core breaks below the core catcher.

6.2.3.4 If the ends of two successive core runs fit together, determine the position(s) of the loss(es) using the following procedure:

- Assign the core loss to obvious loss zones.

- If there are no obvious loss zones, assign the core loss to the lower most rubble zone in that run.

- If there are no rubble zones, place the loss at the bottom of the run.

- Enter the borehole ID, the core loss interval, and the total amount of true core loss on the label of a polystyrene foam "Lost Core Marker" (Attachment C) and place in the proper location.

6.3 Marking Core (Depth Notation, and Stripes)

6.3.1 Measure the core to the nearest 0.1 foot (+/- 0.2 ft) with an engineering measuring tape. The top of the run shall be the starting point for measurement. If the top of the run is angled (e.g., a fracture) and does not match with the previous run, the starting point shall be the mid-point of the fracture.

6.3.2 Circumscribe (as much as possible) the core with footage marks at one-foot intervals. Write depths beside footage marks. When a footage mark falls within a rubble zone, write the depth on an index card.

6.3.2.1 Ensure that the depths written on the core correspond to the depths noted on the Run Marker.

6.3.2.2 Use red and blue permanent markers to place parallel orientation stripes on core, red on right, from top to bottom (see Attachment G).

6.3.3 An alternative method for marking depths and orientation stripes may be used if the core sample is too soft or friable for marking directly on the surface. After core has undergone initial photography and logging has been completed, it may be placed in polyethylene lay-flat tubing and the ends heat sealed (this process must take place subsequent to all field analytical samples being removed). The red and blue parallel orientation stripes and the one-foot depth markings may then be drawn directly on the surface of the polyethylene lay-flat tubing.

6.3.4 Some chemical analyses may be planned to be performed after core has been stored at the SMF. If there is a concern that those analyses could be adversely affected by organic markers an alternative method of marking may be used. If the core is competent, the orientation marks will be created by the etching of two parallel lines into the core surface using an awl and a flat-bladed screwdriver.

The awl line will be etched on the left side of the core, the screwdriver line on the right, for the entire length of the core. The awl will replace the blue orientation stripe, the screwdriver will replace the red orientation stripe. If this alternative marking is used, the footage marks at one-foot intervals will be etched around the core with an awl, actual depths will not be scribed on the core at footage marks for this alternate method of marking. All competent core will be scribed with enough pressure so that the lines are easily visible, but not excessive force that would obliterate or severely alter the surface of the core.

6.4 Initial Core Photography

Field photography of the core prior to excessive handling is a reliable method to document the approximate in situ condition of the core and provides a visual record in the event of core destruction. Field photo documentation occurs twice: while core is in the inner tube and after the core has been logged and boxed. Depending upon the requirements of the site specific Curation Plan core may be photographed with either a still or video camera or both.

6.4.1 Still Photography

6.4.1.1 Initial still photographs will be taken of the core while in the inner liner or core tray, immediately after core orientation and marking is completed.

6.4.1.2 A 35 mm format single lens reflex camera will be used for still field photography. Equipment and accessories will include, but not be limited to, lenses, lens filters, film matched with the type of lighting, camera rack, flood lights or flash unit, color card, scale in 0.1 ft intervals.

6.4.1.3 All core markings will be complete, accurate, legible, and visible to the photographer. A color card and an information card labeled with the borehole ID, run number, depth interval, date and core loss interval(s) will be centered in the photograph above the core. A scale marked in 0.1 ft intervals will be placed parallel to the section being photographed.

6.4.1.4 The camera will be attached to the camera rack and checked for distance, focus f-stop, and shutter speed. The field of view will be checked for shadows or obstructions. Each exposure shall include approximately 2 ft of core; the first exposure will be made at the top of the run, and

continuous exposures made until the entire run of core is photographed.

6.4.1.5 Individual close-up exposures of specific interesting features in the core may be taken after the entire length of the run has been sequentially exposed. This will be done by placing a color card and index card with the borehole ID, depth or depth interval, and description of the feature beside the core interval of interest. Complete the Field Photographic Log (Attachment H).

6.4.1.6 Adhesive labels with the following information will be attached to the film canister and to the roll of film: borehole ID, run number(s), date, roll number, and total footage interval documented by the roll. The film will be locked in a cool dark location by site workers and periodically transferred off-site for development.

6.5.1 Video Photography

6.5.1.1 The site-specific Curation Plan designates whether video photography in addition to still photography, may be necessary for complete records of the subject core. If Video photography is required:

- Initial video tape photographs will be taken of the core while still in the inner liner, immediately after core orientation and marking is completed.

- A high-resolution (8 mm) video camera will be used for video photography of the core. Equipment and accessories should include: camera rack, flood lights, power supply, scale in 0.1 ft intervals.

- All core markings will be complete, accurate, legible, and visible to the photographer. An information card label with the borehole ID, run number, depth interval, date and core loss interval(s) will be placed at the top of the core run. A scale marked in 0.1 ft intervals will be placed next to the core run.

6.5.1.2 The camera will be attached to the camera rack and checked for distance and focus. Ensure the proper cassette is identified and placed in the video camera. The field of view will be checked for shadows or obstructions. The videotaping will proceed from the top to the bottom of

the run. The photographer will provide borehole ID, run number and depth interval information on the audio track of the video by speaking into the microphone during taping. Complete the Field Video Log (Attachment D).

6.5.1.3 Write the following information on the videotape cassette: borehole ID, run number(s), dates, tape number, and total footage interval documented by the tape. Lock tape in a cool, dark location until transfer to the SMF.

6.5 Core Logging

6.5.1 Log the core by run, using the Core Sample Log (Attachment E).

6.5.1.1 Record the following information on the Core Sample Log: Borehole Identification Number, Technical Area and Field Unit identification, Drill Depth Interval, Page number and total pages, Driller, Box Numbers included on log, Start Date/Time, End Date/Time, Drilling Equipment/Method, Sampling Equipment/Method, Prepared By (name of logger), Date, and Checked By, Date.

6.5.1.2 Draw and describe significant structural features and general lithology and petrology (and soil descriptions if applicable) on the form using standard geological symbols and terms (see Attachment F). The Core Sample Log also contains columns for entering the Depth, Recovery (feet per feet %), Field Borehole Analytical Sample Number, Field Screening Results, Top/Bottom of Core in Box, Lithologic Unit, Graphic Log, and Notes.

6.5.1.3 The columns on the log will be used to record a lithologic description of the rock, as well as the accepted geologic formation and/or member names. Depths will be recorded in feet to the nearest 0.1 ft; features may be measured in tenths of a foot, centimeters, or millimeters as appropriate.

6.5.1.4 This log format will be used to ensure that characteristic features of lithologic units will not be overlooked. Charts, tables, and other references will be available at the site to aid the site worker in logging features in a consistent manner. This logging format consists of three parts: a) Primary Descriptive Terms, b) General Features, and c) Specific Features.

- Primary Descriptive Terms: noted for every lithologic unit in the following order, offering a broad skeletal description of the interval.

  Unit - a distinct body of rock, representing a discrete geologic event; distinguished from other units above and below it by different physical properties (e.g., color, mineralogy, and morphology).

  Type - this is an adjective describing the unit, suggestive of the depositional mode and is generally ash flow, ash fall, bedded, or reworked.

  Color - hue and tone noted under appropriate lighting conditions, along with reference to a standard geologic color chart (e.g., geological Society of America Rock-Color Chart); e.g., light red (visual), SR 6/6 (color chart reference).

  Welding - (for use on tuff units) degree of welding: choices are nonwelded, moderately and densely.

  Alteration - degree of alteration (primarily for use on tuff units); choices are vitric, devitrified, and vapor phase altered.

  Core Competency - how well does the recovered core holds together. Terms such as soft/hard, poorly indurated/well indurated are acceptable.

- General Features - characteristic of the entire unit interval; estimate percent volumes (volumetric proportions) of these features, when applicable, using a suitable percent volume chart; when present general features will be described in the following order; additional detail may be added as appropriate:

  Pumice - includes percent volume of the interval, alteration features, color, size range, and flattening ratio.

  Lithic fragments - includes percent volume of the interval, rock type, color, shape (sphericity and roundness) and diameter of fragments.

Phenocrysts - includes percent volume of the interval, mineral type (if distinguishable and expressed minimally as mafics/quartz/feldspar), color, shape, and diameter.

Unit contact - describes nature of contact with underlying unit; generally ranges from sharp to gradational but may include any appropriate phrase.

Matrix - describe color and whether matrix is dense and non-porous or open and porous.

- Specific Features: Specific features are characteristic of a zone within a unit interval. These are isolated, localized features and are not common throughout the unit. Due to their localized nature, these features always contain depth notation, e.g., "at 702.3 ft, a 0.1 ft elongate fracture with calcite infilling" or from 325.7 - 328.2 ft, numerous very small (0.05 ft) euhedral, very dark red (5R2/6) lithic fragments." Also foam markers (run, core loss) will be logged here.

6.6 Removal of Analytical Samples

In order to establish the correct origination point for the analytical samples, the core will be measured before the removal of any analytical samples. No core will be removed from the field before it has been marked and photographed unless specifically called for in the Curation Plan. Individual sections of a core that contain time sensitive analytical samples will be temporarily packaged immediately after the core run has been moved to the Sample Management Core Logging Trailer (see Section 6.2, Temporary Packaging of Time Sensitive Analytical Samples).

6.6.1 Prior to the analytical samples being removed from the drill site, site workers will complete the Field Borehole Analytical Sample Removal Checklist (Attachment B). This checklist will be used for transfer of all analytical samples from site workers to off-site, including to the SMO. The following steps outline the procedure for removal of analytical samples from the drill site:

- Evaluate the list of requested intervals or features from the Curation Plan.

- The core may need to be broken or cut to retrieve a portion for an analytical sample.

- Temporarily package individual sections of core containing analytical samples that would suffer damage if left exposed while awaiting measuring.

- Measure, mark, photograph, and log core.

6.6.2 Affix a sample label (Field Borehole Analytical Sample) to the packaging material containing the analytical sample. The Field Borehole Analytical Sample label contains Borehole ID, interval, requester, and unique number.

6.6.3 Remove the analytical sample from the core and place a foam marker at the location the sample portion was removed. Affix the duplicate sample sticker (Field Borehole Analytical Sample) to the foam marker.

6.6.4 Release the analytical sample(s) to the requester (in most cases SMO) who will package and ship the analytical samples according to LANL-ER-SOP-1.02, Sample Containers and Preservation and SOP-1.03, Handling, Packaging and Shipping of Samples. Document the process according to SOP-1.04, Sample Control and Field Documentation.

6.7 Core Box Loading and Storing

6.7.1 Boxing Samples

6.7.1.1 Store waxed (interior only) cardboard core boxes fitted with polystyrene foam cradles in sufficient numbers to accommodate projected daily core recovery cycles at the drill site.

6.7.1.2 Box the core with the top of the run in the upper left corner and with core orientation maintained (Attachment G).

6.7.1.3 Transfer all polystyrene foam markers (Run, Lost Core and Analytical Sample Removed) from their position in the core rack to their corresponding position in the core box during the loading process.

6.7.2 Bagging Rubble

6.7.2.1 Sufficient space will be left in the core box for intervals of rubble between sections of whole core. Rubble zones will be removed with a minimum of disruption from the core tray (or inner tube) after all the whole core sections have been placed in the core box. An interval of rubble will be

pushed to the end of the inner tube. A piece of split PVC tubing slightly larger in diameter than the inner tube will be cradled under one end of the inner tube until the ends are parallel. A piece of lay-flat tubing will be slipped over the inner tube, the split PVC tube, and the interval of rubble.

6.7.2.2 The section of rubble will then be pushed over the edge of the inner tube while the PVC and lay-flat tubing are pulled parallel and away from the inner tube. All rubble will be bagged to the nearest one foot; that is, no lay-flat tubing will contain more than one foot of rubble nor will it contain rubble from both sides of a footage mark.

6.7.2.3 After the rubble has been transferred from the inner tube (or core tray) the split PVC tube will be removed, and the ends of the lay-flat tubing will be heat sealed. The sealed sections of rubble will be labeled with borehole ID and depth intervals represented by writing the top depth at the top of the sealed tubing and the bottom at the bottom of the tubing. Orientation stripes will be placed on the tubing as described in Section 6.3.

6.7.2.4 After each run is loaded enter information on the contents of the boxes containing that run on two adhesive labels. The label is shown in Attachment G. Affix these labels in the left-hand corner of the down hole end on both the lid and body of the box.

6.7.3 Photography of Boxed Core

6.7.3.1 Site workers will photograph boxed core prior to shipment off site. A card displaying box bar code number (FCT), borehole ID, date, name of photographer, and color bar will be placed adjacent to the core box. A scale marked in 0.1 ft intervals will be placed parallel to the box. Complete the Field Photographic Log (Attachment H).

6.7.4 Sealing of Core

6.7.4.1 All core samples will normally be placed in polyethylene lay-flat tubing and heat sealed or folded over the end of the divider in an effort to preserve the core and to minimize the release of possible contaminants from the samples. Any deviation from this practice must be placed in the site-specific Curation Plan.

- Each row of core will be placed into polyethylene lay-flat tubing as a unit. This will include the core and packaged rubble, the polystyrene foam core cradle, and the cardboard divider pad. The entire unit will be carefully lifted from the box and slipped into the lay-flat tubing and heat sealed or folded under the divider.

- At this point the surface of the lay-flat may be marked with orientation, and footage marks if the core was too unconsolidated or soft to do so earlier.

6.8 Cuttings Handling Procedure

Collect cuttings if specified in the Curation Plan. Collect specified amounts and handle according to Curation Plan. Collect cuttings that represent the targeted interval.

6.8.1 Field Screening

6.8.1.1 The ESH-1 and ESH-5 technicians will field screen the cuttings for radiation and organic vapors. A comparison will be made with the action levels for radiation and organic vapors established in the site specific Health and Safety Plan. If readings indicate activity or concentrations above action levels, then cuttings handling activities will temporarily be suspended. A decision will be made by the SSO and FTL as to restarting work with upgraded personal protective equipment, modification of the level of logging required in this procedure, or other means to ensure the health and safety of workers. Field screening values for penetrating radiation, radiologically contaminated particles, and volatile organic contamination will be recorded on the SMF Field Screening Log (Attachment J) or equivalent.

6.8.1.2 Cuttings will be field screened on a run by run basis, the data recorded and certified by the ESH-1 and ESH-5 technician(s) on the SMF Field Screening Log or equivalent. The Log will indicate whether the samples are above or below the acceptance criteria. If above, the samples will be held at the Sample Storage Trailer on site until a determination is made as to their disposition. If below, the samples are now available for release for transport and acceptance at the SMF (SM-271). There may be additional screening required prior to unconditional release to the SMF.

6.8.2 Logging Cuttings by Site Workers

- Lay out cuttings in rows convenient for logging.
- Make subdivisions within these rows at the discretion of the on-site geologist.
    - Put a marker in the place of any removed samples to preserve the continuity within the rows.
    - Log cuttings by scanning the rows and determining lithologic breaks based on color or other textural changes. Write lithologic descriptions on the Field Bit Cuttings Log (Attachment I).

6.8.3 Bagging

- Place a sufficient quantity of representative cuttings, as specified in the Curation Plan, in plastic sample bags (alternative means such as glass, plastic jars, or polyethylene lay-flat tubing may be used if dictated by the Curation Plan).
- Label the bag. A bag label will be marked with the following information: Date, Bag Number, Borehole Identification, Depth Interval, and Collector.
- Place a duplicate label printed on non-tearing, waterproof paper inside the bag and tightly seal.

6.8.4 Boxing and Labeling

- After cuttings have been bagged and labeled, box the bags in a manner similar to core boxing (see Section 6.7).
- Record the interval of the cuttings contained in the box on two adhesive labels. Affix these labels in the left hand corner of the down hole end on both the lid and the body of the box.
- Seal with nylon filament strapping tape in preparation for temporary storage at the Sample Storage Trailer.

7.0 REFERENCES

ER-QMP, Environmental Quality Program
LANL-ER-SOP-1.01, General Instructions for Field Investigations
LANL-ER-SOP-1.02, Sample Containers and Preservation

LANL-ER-SOP-1.03, Handling, Packaging, and Shipping of Samples
LANL-ER-SOP-1.04, Sample Control and Field Documentation
LANL-ER-SOP-1.05, Field Quality Control Samples
LANL-ER-SOP-1.06, Management of RFI-Generated Waste
LANL-ER-SOPs in ER SOP Manual, Section 2.0, Health and Safety in the Field
LANL-ER-SOP-4.01, General Drill Site Management
QP-2.2, Personnel Orientation and Training
QP-4.3, Records Management

"Branch Technical Procedure: Sample Management for the Yucca Mountain Project Office," 1989, Yucca Mountain Project Office, Las Vegas, NV

Goff, S.J., 1986, "Curatorial Policy Guidelines and Procedures for the Continental Scientific Drilling Program," Los Alamos National Laboratory Report LA-10542-0BES, 23

Goff, S.J., 1988, "Field Procedures Manual: Shady Rest, California, and Sulphur Springs, New Mexico," Los Alamos National Laboratory Report LA-11 453-0BES, 13 p.

8.0 RECORDS

The FTL submits the following records to the Records Processing Facility in accordance with QP-4.3, Records Management.

8.1 Field Photographic Log

8.2 Field Video Log

8.3 Daily Drilling Summary

8.4 Field Borehole Analytical Sample Removal Checklist

8.5 Field Screening Log

8.6 Core Sample Log

8.7 Field Bit Cuttings Log

9.0 ATTACHMENTS

Attachment A - Equipment and Supplies Checklist for Field Logging, Handling, and Documentation of Borehole Materials (1 page)
Attachment B - Field Borehole Analytical Sample Removal Checklist (1page)
Attachment C - Run Markers (1page)
Attachment D - Field Video Log (1 page)
Attachment E - Core Sample Log (1 page)

Attachment F - Marking and Boxing Core (1 page)
Attachment G - Field Photographic Log (1 page)
Attachment H - Field Bit Cuttings Log (1 page)
Attachment I - Field Screening Log (1page)

EQUIPMENT AND SUPPLIES CHECKLIST FOR FIELD LOGGING, HANDLING, AND DOCUMENTATION OF BOREHOLE MATERIALS

____ engineering measuring tape
____ colored temporary markers
____ desk
____ core racks
____ work table/surface
____ indelible marker pens
____ hand lens
____ grain-size chart
____ polystyrene core cradles
____ knifes/blades
____ chisel
____ magnet
____ rags and sponges
____ PVC core trays
____ non-tearing, waterproof labels
____ cuttings containers
____ Field Borehole Analytical Sample Checklist
____ polystyrene run blocks
____ miscellaneous office supplies
____ safety equipment
____ container labeling and packaging equipment
____ wire mesh sieve
____ waxed cardboard boxes and divider (specifications depend on core diameter)
____ Polyethylene Lay-Flat tubing

____ impermeable packaging
____ pocket transit (0-360 degree)
____ rock hammer
____ dilute HCl
____ heat sealer
____ 4" x 6" index cards
____ photographic equipment
____ videographic equipment
____ computer
____ spray bottle
____ filament tape
____ rock breaker/or rock saw
____ protractor
____ binocular microscope
____ electric power
____ standard rock-color chart
____ Field Video Log
____ Field Photographic Log
____ Field Bit Cutting Log
____ Core Sample Log
____ Daily Drilling Summary
____ Field Screening Log
____ geologic dictionary and other references and volumes
____ Chain-of-Custody/Request for Analysis Forms
____ Polyethylene sheeting

Other:

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FIELD BOREHOLE ANALYTICAL SAMPLE REMOVAL CHECKLIST

Sample Management Facility

Recipient: _____ Address: .....
Print Name
Organization: .....
Telephone Number: _____

Form Completed By: _____ _____ Page ..... of
Print Name Date

Borehole ID: _____ TA/FU _____ / .....

FIELD BOREHOLE ANALYTICAL SAMPLE INFORMATION			CHECKLIST		
Field borehole Analytical Sample Bar Code Number (SpecID)	Affixed	Interval Removed: / Date Removed:	Foam Marker?	Marked & Tagged?	Packaged? Described?

FIELD BOREHOLE ANALYTICAL SAMPLE TRANSFER

Person Releasing Custody:		Person Accepting Custody:	
Print Name/Signature	Date/Time	Print Name/Signature	Date/Time

Checked By: (**SMF USE ONLY)**

Print Name/Signature Date/Time

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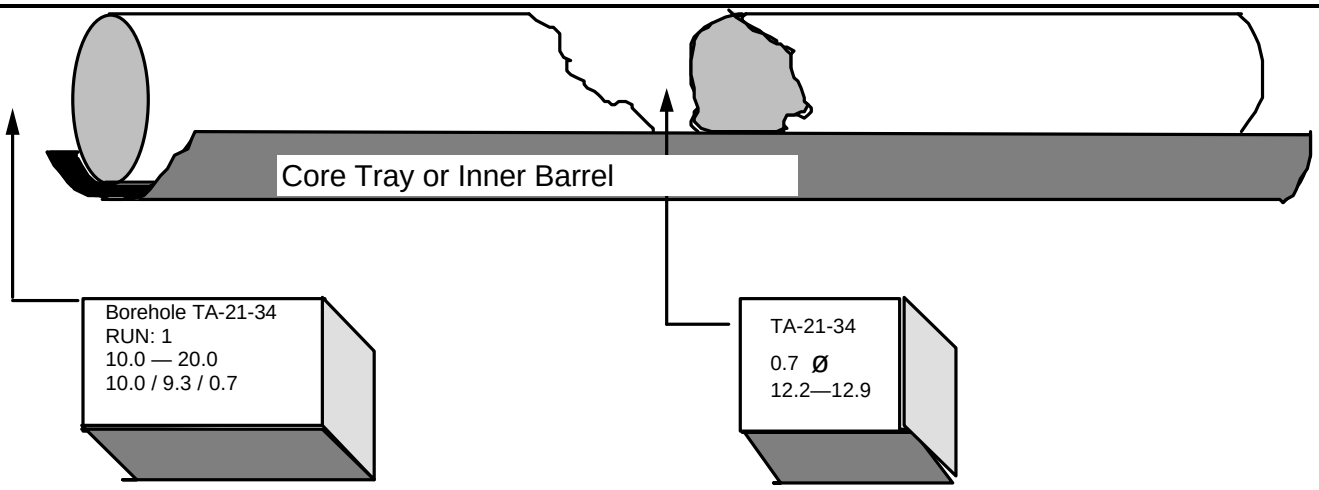
MARKER PLACEMENT



Run Marker

Lost Core Marker

Example of Marker Placement

Borehole ID Number Run Number Footage Interval Drilled/ Recovered/ Lost

Run Marker

Borehole ID Number Amount Lost Core Loss Interval

Core Loss Marker

FIELD VIDEO LOG

Sample Management Facility

Checked By:_____ _____ Page ..... of

Print Name/Signature Date

Borehole ID:_____ Cassette #_____ TA/FU_____/....._____

Run #	Run Interval:	Counter Interval:	Remarks:	Photographer	
				Initials	Date

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CORE SAMPLE LOG

Sample Management Facility

Borehole ID:_____ TA/FU:_____/_____ Drill Depth From:_____ To_____ .....Page ____of ___
Driller:_____ Box:_____ Start Date/Time:_____ End Date/Time_____
Print Name
Drilling Equipment/Method:.....
.....
.....

Sampling Equipment/Method:.....
.....

Depth (Feet)	Recovery (feet per feet/ %)	Field Borehole Analytical Sample #	Field Screening Results	Top/Bottom of Core in Box	Lithology – Petrology - Soil	Graphic Log	Lithologic Unit	Notes

Prepared By: _____ _____
Print Name/Signature Date

Checked By: _____ _____
Print Name/Signature Date

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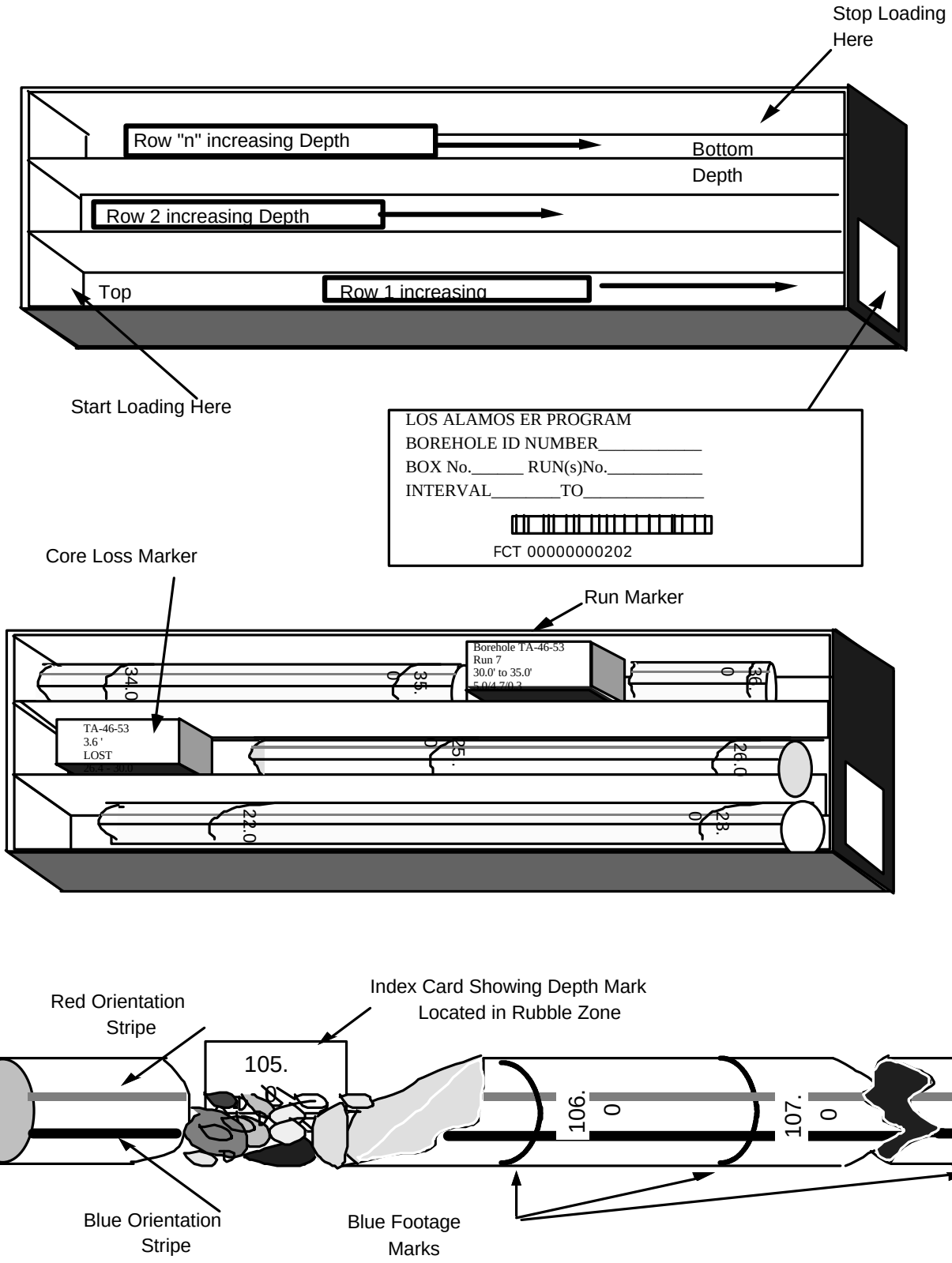
MARKING AND BOXING CORE



FIELD PHOTOGRAPHIC LOG

Sample Management Facility

Roll	Exposure				Run		Box		Other
No.	ASA	No.	F-stop	Speed	No.	Interval	Bar Code #	Interval	

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BIT CUTTINGS LOG

Sample Management Facility

Borehole ID:_____ TA/FU:_____/_____ From:_____ To_____.....Page ____of ___

By:_____ Date(s):_____ Checked By:_____ .Date_____

Print Name Print Name

Box #(s)_____ Drilling Equipment:.....

_____

Depth or Depth Interval	Amount Recovered (No. of Bags Collected)	Sample Splits Amount, Requester Organization	Lithology	Comment

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FIELD SCREENING LOG

Sample Management Facility

TA/FU:____________/____________ Borehole ID:______________________ Checked By:__________________________________ Page_____of_____

Print Name Date

Run		Hazard	Screening Method	Reading	Acceptance Criteria		Technician's Certification
No.	Interval				BELOW	ABOVE	

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